The JOURNAL *of* GEOGRAPHY

Copyright 1941, by the National Council of Geography Teachers

VOLUME XL NOVEMBER, 1941 NUMBER 8

NETHERLANDS WEST INDIES: LIFE AND WORK

GEORGE S. CORFIELD
State Teachers College, Duluth, Minnesota

The most vital sea area of the United States lies between the Americas—the Caribbean Sea and its alcove, the Gulf of Mexico. A great semi-circle of enclosing islands makes the Caribbean a protected ante-room to the Panama Canal.

For our East-West Coast traffic the most important entrance to the Caribbean area is the 60 mile wide Windward Passage between the eastern tip of Cuba and the westernmost tip of Haiti. Three other important entrances lie either side of the Windward Passage. To the north-west the Florida Straits accommodate the inter-coastal trade, while to the east Mona Passage, 75 miles wide, between the Dominican Republic and Puerto Rico divides the European traffic with the Trinidad Passage a 100 mile opening between British owned Grenada and Trinidad, guarded by a third British possession, Barbados, easternmost of the festoon of Lesser Antilles.

Thru this entrance passes the combined traffic of eastern South America and a large block of European trade bound for the west coast of the Americas or the Orient. As traffic enters the Caribbean thru this portal it skirts the northern coast of the continent and passes close by the Netherlands islands of Aruba, Bonaire, and Curacao—The A B C of the North Shore. Even traffic using Mona Passage, which more directly faces Europe, would not pass far from these islands on its way toward the Panama Canal. The strategic location of these Dutch Islands seems of utmost importance either in peace time or war.

In earlier days merchant ships crossed the Atlantic in fleets for mutual protection and broke their caravans at the coaling station of St. Thomas, an emporium of sea trade. With the opening of the Panama Canal and, later, the transfer of the Virgin Islands to the United States, St. Thomas' position rapidly gave way to an equally good port and harbor 600 miles nearer the canal—Willemstad,

capital city of the Dutch Colony of Curacao. The neatly trimmed north shore of South America devoid of favorable harbors, save one, repells direct trade with the northern countries, a fact enhancing the importance of Willemstad as an entreport for Caribbean South America, a position undiminished to this day.

Discovery and History

Discovered by Amerigo Vespucci in 1499, first occupied by the Spanish in 1527, little was known of these islands until the Dutch harassed the Spanish in 1634 and established a settlement a little later. It was under Peter Stuyvesant's regime as governor after 1643, that the colony flourished and became a great commercial center for the whole Caribbean, the prosperity of which was due to no small extent to slave trade. Altho the British held the islands for a short time, they finally fell into Dutch hands again and since 1814, for over a century have been important possessions in the West Indies of the Netherlands. Abolition of slavery ruined the slave trade. Prosperity declined for a time but flourished again by the establishment of the oil industry on Curacao in 1916, and on Aruba in 1925.

Area and Topography

The territory of Curacao consists of three islands (half of St. Martin) near our Virgin Islands and the three above mentioned twenty to sixty miles off the Venezuelan coast, with a combined area of 384 square miles, but 90 per cent of that area is contained in the southern group.

General belief suggests that these islands were formed by a northern prong of the Andes which sank beneath the water surface. Evidenced by old shore lines, emergence of the limestones and their foundation rocks followed. With the subsequent erosion, some limestones still remain in the form of cuestas around the coasts. A slight submergence of the land permits the sea to "drown" certain of the steep-walled valleys that cut thrû these coastal cuestas as well as parts of wider valleys behind the limestone ridges.[7] This accounts for the distinctive fan shaped embayments, with the bottle neck entrances found on the islands; as for example the harbor of Willemstad on Curacao.

Exposed to surfs excited by the steady northeast trades the northern shores of the islands are harborless. Coral reef barriers

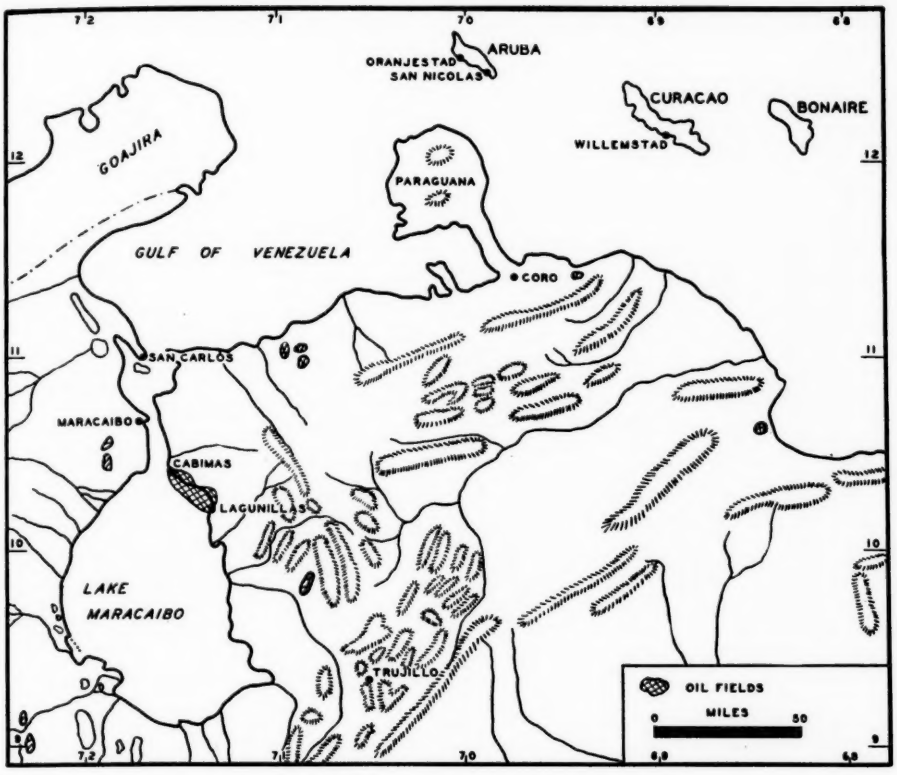

Fig. 1. Place map showing the relative position of Aruba, Bonaire, and Curacao to the Lake Maracaibo region, chief source of crude petroleum for the refineries on Aruba and Curacao. Shallow water at the San Carlos bar, necessitates especially built tankers to bring the petroleum from the basin to the islands.

fringe the leeward side of Aruba, and separated from the shore by lagoons furnish natural quiet harbors for ships, and emergency seaplane anchorages. Examples of this are seen at Oranjestad, capital of Aruba and San Nicholas on the eastern tip, site of the world's largest oil refinery.

Climate and Natural Vegetation

While Aruba, Bonaire and Curacao lie in the path of the trade winds which blow steadily from the northeast or east, little precipitation falls, and aridity leaves its impress on the native vegetation.

First the area of the islands is too small to have sufficient power to produce rain from the heavily laden clouds. Also no altitudes are sufficient in area or height to produce rainfall. The highest

point on Curacao is 1220 feet, on Aruba 617 feet, while Bonaire has a higher altitude than Aruba, 787 feet.[7] These altitudes are only recorded as small peaks. Willemstad on Curacao has a mean annual rainfall of 22 inches while Oranjestad in Aruba has 17 inches.

Secondly, since these figures show the average rainfall over a period of years, they do not indicate the fluctuation from year to year. The islands reflect the dry climate in drought resistant plants as cacti, agaves, alois, and divi divi. Algarroba trees dot the horizon frequently; they too struggle for an existence.

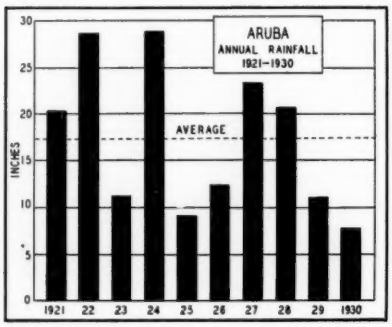

Fig. 2. Graf showing the unreliability of rainfall on Aruba. The average only reaches seventeen inches.

Many northeastern sections on all the island lie void of any vegetation—bare limestones are exposed. Along the leeward coasts around the lagoons fringes of mangrove occur. Paths of intermittent streams are distinguishable by the presence of coconut and papaja trees and cashew bushes. However, the general aspect is one of aridity.

POPULATION AND LANGUAGE

Since 1870 the population of the Colony of Curacao increased 300 per cent due chiefly to the increases in the three southern islands, especially Curacao and Aruba, which account for 85 per cent of the population. For over fifty years Curacao has had 60 per cent of all the people, most of them residing in and near Willemstad. In 1938 Curacao had twice and Aruba three times as many people as in 1915, due to the establishment and growth of the oil refineries. Bonaire's population has been attracted to the oil refineries on the other two islands.

POPULATION DATA[5]

	1870	*1915*	*1930*	*1938*
Aruba	3,792	9,204	15,687	28,155
Bonaire	3,816	6,592	6,139	5,536
Curacao	20,844	33,677	49,444	62,798

In 1937 the birth rate for the colony was 32.2 and the death rate 10.84 per 1000. In 1925 yearly rainfall of nine inches precluded normal growth of vegetables. The 1926 deaths, three times as great as the average, resulted from an epidemic of scurvy.

The Composition of the Population

While no data are available concerning the composition of the population, a person watching at a busy street corner in the city or walking thru the countryside receives the impression of heterogeneity. For the last ten years colored immigrants have poured into Curacao and Aruba from Barbados and other neighboring islands. Syrians, Hindus, Chinese, Portuguese and whites from England, United States, Venezuela, Netherlands and other countries make the racial picture quite cosmopolitan. Negroes and Mulattoes constitute between 80 and 90 per cent of the total.

The language of the older inhabitants combines words and phrases of several tongues including English, Dutch, Spanish, Carib, and to some extent Portuguese into a lingo known as *Papiamento*. The frequency of words of each tongue reflects the influence of that country in the islands. For example Spanish, English, Dutch words predominate while German, French, Portuguese are heard less often. No grammar has been made as yet for this jargon. This example shows how papiamento uses expressions, words and terms from other languages, Ainda, bo no a bari Kamber? (Have you not swept the room?) Ainda, the Portuguese for yet; bo no a bari (have you not swept), a corruption of the Spanish No ha barri do usted, and kamber, a corruption of kamer a Dutch word for room, completes the illustration.

Land Utilization

Agriculture ranks second to petroleum refining in the number of people employed. Size of properties reflect the dominance of the petroleum industry. About three-fifths of the total land area of Curacao lies in units of more than 250 acres, while the remainder is divided, tho not equally, between the smaller unit holdings and government owned lands. High labor costs keep many of the larger holdings from making great profits. Labor now finds more lucrative employment in industry and lands raising crops for home consumption, now accommodate an increasing livestock industry. Owing to the aridity of the islands goats and sheep outnumber cattle and horses. Curacao supports about 111 goats per acre while Aruba grazes about 160, and Bonaire exceeds both by grazing 270 per acre. Goat skins, totaling $83,000 in value, came from the islands in 1937. During the last decade goats showed an increase in each island especially Bonaire and Aruba. Cattle on the other hand increased on Curacao and Aruba. In 1930, Aruba possessed only one

cow while in 1937 it boasted of over nine hundred. Both the milk and meat are used locally, outside the concessions of the refineries. Mules and asses outnumber horses as beasts of burden since they subsist upon scantier vegetation. While visiting these islands it was common to see both goats and sheep as well as mules and asses feeding upon the broad-leaved cactus and liking it.

Small property holdings characterize Aruba as only 2.5 per cent of its area lies in holdings over 250 acres, quite in contrast with 56 per cent of Bonaire's area in units of the larger acreages. On the drier uplands, on thru limestone soils, the Aloes plant flourishes. The gathering of Aloes ranks high among agricultural activities. Used in making medicines, three quarters of the world's supply comes from these islands and 90 per cent of that supply goes to the United States.

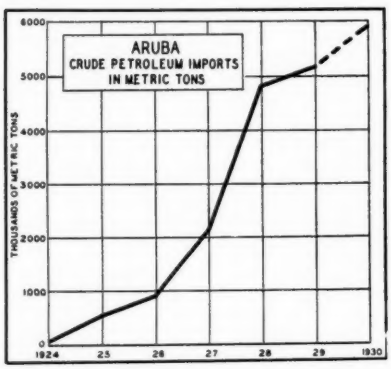

Fig. 3. Before 1925 Aruba only served as a relay station for Venezuela's crude oil. Here ocean tankers met the shallow draft tankers from Lake Maracaibo. After the establishment of the refinery (1925) the rise in imports was meteoric.

In the stream beds, or on irrigated areas as at Fontain, Aruba, fruits and vegetables are grown. Grain sorghum, and beans represent the vegetables.[4] Papajas, cashews, coconuts, agaves and some melons represent the fruits. All are produced by the small farmer for local consumption.

Mangroves along the southern shores and divi divi pods furnish an extract used in tanning leather. The United States takes the bulk of the exports.

THE WORK OF THE PEOPLE

The Petroleum Industry. Established in Curacao during the World War and in 1925 on Aruba, the petroleum refining industry surpasses all other industries. Dutch, English and American capital have been responsible for this development. It is this industry together with the strategic location of the Dutch West Indies which give them importance and significance far out of proportion to their areal extent.

Aruba and Curacao represent the "bottle neck" of the northern South American oil industry. On these islands stand great refin-

eries of Standard Oil of New Jersey and the Royal Dutch Shell with a combined crude oil capacity of more than 500,000 barrels per day. If necessary, these plants are sufficient to process two-thirds of all the oil produced in the South American area.[2]

The Maracaibo Basin furnished the first oil to the Dutch Islands. Sand bars have formed across the outlet of Lake Maracaibo where waters of the Caribbean Sea and the outlet neutralize their force. Chief among those formed is the San Carlos Bar. The bars prohibit large ocean tankers from entering and necessitate the use of shallow draft vessels under 12 feet. Political reasons prevented the bars from being dredged. Stability of the Dutch government and its expressed policy toward oil companies, prompted the Dutch concerns and encouraged those from other countries to build on Dutch soil. Proximity to the Maracaibo Basin lead to Curacao and Aruba.

Fig. 4. As the natives are so dependent upon rain water, churches built large cisterns to hold the water and where individual supplies give out, parishioners may receive their water at the church cistern. Belfrey to the left. (Photo by Author)

Labor supply comes from wide areas. Engineers, foremen, overseers and the like are recruited under contract from Europe or the United States. Labor needed for other purposes comes from nearby Venezuela, Colombia, and other West Indian Islands. Attractive wages in the petroleum industry have made heavy drains on labor formerly connected with other economic activities. Today native workmen outnumber imported skilled labor, three to one.

Rapid expansion characterizes the industry. Population increases, as well as import and export data furnish testimony. Between 1933-1937 value of the imports of petroleum nearly doubled while exports of petroleum and petroleum products made a 57 per cent gain within the same years.

During 1938 Aruba and Curacao shipped to more than fifty different countries. Eighteen of these were in Europe, with England taking about 30 per cent of the refined products.[2]

Aridity again is expressed in the imports to the refineries. Altho Aruba has one and Curacao two purifying plants, no local water supply is used. Returning tankers bring good drinking water from New York or other hydrants as ballast. This is purified and used

exclusively thruout the plants. All foods likewise are imported. As the local environments furnish little.

Manufacturing. Except for petroleum products, manufacturing still exists in the household stage. Fine needlework done by women and girls thruout the islands finds ready sale in Willemstad to tourists.

The making of straw hats employs many native women who consider it as a supplementary activity for ready cash. The Lake Maracaibo region in Venezuela furnishes the leaves of a palmetto (Carludovica palmata) as straw. When insufficient material is available from Venezuela, Jamaica and Ecuador supply the deficiency. Since all work is hand labor, a good grade requires five days, while a cheaper harvest hat may be made in eight to twelve hours. Local jobbers receive $2.00 to $2.60 a dozen in the rough before they are trimmed, washed and bleached. The United States purchases 60 per cent of those exported.[9]

Fig. 5. Modern Water Vender. The large settlements reserve their drinking water at five cents a can. Many country folk still dip from unprotected wells. (Photo by Author)

Salt Industry. Three hundred years ago, the Dutch seized the colony of Curacao for salt to preserve its catch of herring, but now it is no longer important. Only Bonaire's Salinas yield export salt today, and that valued at $1,600 per year.[3]

Phosphate. Among products derived from natural resources, phosphate of lime ranks first in importance. Formerly mined on Aruba and Curacao, only the Iafilberg (Table Hill) deposits on Curacao are active today. Used in the manufacturing of fertilizers, Finland, Denmark, Germany and the Netherlands absorb the entire output, which in 1937 was valued at about $350,000.[3]

Fishing. Fish supplement the diet of the native. Red snapper and Spanish mackerel furnish excellent eating. Caught by natives in small row boats, they are brought to shore, where women and men clean them. Women, "heading" the baskets made locally from roots of the Mangrove, find sale in the larger towns. Usually they weave straw hats as they squat at the street corners awaiting customers. Situated as the islands are, at the edge of the continental shelf, the

shallower, swift flowing waters between the islands and mainland provide natural fishing grounds.

Transportation

Improved roads especially on Aruba and Curacao connect the capital cities with outlying areas. Automobiles are used on all the A B C group. No railways exist, altho a narrow gauge route formerly connected the phosphate mines in Aruba and San Nicolas.

Willemstad, one of the best of the harbors thruout the Caribbean area, is one of several good harbors along the southern coast. Caracao Bay, five miles southeast of Willemstad, accommodates vessels of the largest size. On Aruba, Paarden Bay, harbor for its capital Oranjestad, admits vessels of no more than 20 foot draft. At San Nicolas Bay, near the southern end of the island and at the larger refinery, has a depth of 41 feet at its entrance. There are no harbors on Bonaire. Of all these Willemstad surpasses in location, size and anchorage area. To enter Willemstad ships proceed thru outer Santa Ana Bay to a channel 330-975 feet in width, with the shallowest depth of 45 feet. Beyond this mile long channel lies the inner Bay, Schottegat, with a central anchorage area of nearly a 1000 feet in diameter. The greater part of the Schottegat has a depth of from 48 to 60 feet.

Fig. 6. Fisherfolk in Curacao divide the work. Men usually catch the fish—red snapper and Spanish mackerel—while women clean and sell them. Often they squat at street corners to sell the fish from unprotected baskets. (Photo by Author)

Off the beaten path of hurricanes, sheltered on the leeward side of the island, facing the mainland, Willemstad lies directly on the shortest European route to the West Coast of the Americas.

These factors coupled with the fact of possessing a commodious, natural, land-locked harbor give this port an enviable position. Normally, the islands are interconnected with mail and passenger service.

The Dutch air service operates 1850 miles of routes along the north coast of South America. This connects Dutch Guiana, Colombia, and Maracaibo, Caro, La Guaira in Venezuela, with Aruba and

Curacao. Each has a government and commercial airport and in the Schottegat, Curacao has an established seaplane anchorage. For this sea or air service, ample quantities of fuel oil for bunkering and aviation gasoline may be supplied as long as the refineries operate.

CONCLUSION

For responsibility of great shifts of population within the Caribbean area, the petroleum refineries of the Netherlands West Indies take their stand along with the sugar plantations of Cuba, the Panama Canal Zone, and the banana plantations of Santa Marta. As long as the supply of crude oil exists in Venezuela and Colombia and world markets increase their demands, these refineries will continue to absorb the able-bodied of the immediate area. Population statistics testify to the increase to date.

As long as Curacao, with its excellent, commodious harbor, stands between the Trinidad Passage, widest of the openings into the Caribbean, and the Panama Canal, its strategic position will go undiminished until such time as conditions may alter world trade routes.

As long as these conditions exist all other work on the islands even tho important in itself, will dip its colors to the paramount activities of petroleum refining and commercial enterprise.

REFERENCES

1. E. V. Dunbar. What Oil Did to Curacao, JOURNAL OF GEOGRAPHY, Vol. 33, pp. 340-345, May 1934.
2. J. P. O'Donnell. War Hits Oil Operations in South America, *The Oil and Gas Journal*, pp. 32 ff., August 15, 1940.
3. R. R. Platt and Others. The European Possessions in the Caribbean Area, American Geographical Society, pp. 70-79; 94-95, 1941.
4. Robert S. Platt. A Curacao Farmstead, JOURNAL OF GEOGRAPHY, Vol. 35, pp. 154-156, April 1936.
5. Statesman Yearbook—various years.
6. Amry Vandenbosch. Dutch Problems in the West Indies, *Foreign Affairs*, Vol. 9, pp. 350-352.
7. J. H. Mestermann. The Geology of Aruba, Utrecht, 1932.
8. U. S. Department of Commerce Reports, No. 33, August 15, 1927.
9. U. S. Department of Commerce Trade Information Bulletin No. 405.
10. *The Bulletin of International News*, pp. 772-773, June 29, 1940.
11. World Oil Refinery Survey, *Oil and Gas Journal*, December 28, 1939.
12. *United States News*, pp. 29, July 5, 1940.

GEOGRAPHY IN AMERICAN UNIVERSITIES*

RAFAEL PICÓ
University of Puerto Rico

THE RISE OF MODERN GEOGRAPHY

Modern geography is a young science. Altho known under that name even before Greek and Roman times, its contents until the beginning of the nineteenth century consisted largely of a group of uncorrelated facts concerning the earth and its inhabitants. Two distinguished pioneers in Germany are largely responsible for the transformation of geography into a modern science: Alexander Von Humboldt (1769-1859) and Karl Ritter (1779-1859). Humboldt, the outstanding field worker, thru his voyages to the Americas and his literary ability to record and interpret what he thoroly observed in small areas, has been called the precursor of the modern technique of micro-geography.[1] Leading as a geography scholar in academic circles was Karl Ritter, the first professor of geography in Germany and probably in the world.[2] He lectured at the University of Berlin from 1820 to 1859 and was a brilliant exponent of the German research worker. His voluminous work, the "Erdkunde," embodied the principles of regional or macro-geography that today holds sway in modern geographical science. Altho criticized by some[3] for his teleological theories that visualized the environment as fulfilling a pre-ordained purpose, in his work he left a brilliant tradition of research and a solid philosophical interpretation of the nature of geography. Ritter and Von Humboldt were succeeded later in the nineteenth century by a galaxy of distinguished German scholars: Frobel, Gerland, Hettner, Penck, Perschel, Ratzel, Richthofen, and others. Their activities were centered much more on the physical aspects of geography, perhaps influenced by the growth of such systematic sciences, as physics, chemistry, and especially geology. Alfred Hettner, today over 90 years old, has maintained the Ritterian tradition and is more the regional geographer, a potent influence on German and even some American geographers. Friedrich Ratzel (1844-1904) distinguished himself as a political and human geographer. Indirectly, he contributed to

*This paper in its original form was prepared by the author while acting as Instructor in Geography at the Catholic University of America. Grateful acknowledgements for suggestions received is hereby extended to Drs. A. K. Botts, W. L. G. Joerg, and Clarence F. Jones.

the philosophy of American geography of the early part of this century.

DAVIS AND SEMPLE

The influence of the German geographical school was exerted in the United States mainly thru two distinguished American geographers: William Morris Davis (1850-1934) and Ellen Churchill Semple (1863-1932). In the case of Davis, still more potent influences were the works of Gilbert, Powell, and other physiographers doing exploratory work in the American west. Davis has been called the father of American geography and in view of his writings, teachings, and personal influence on present workers in the science, he well merits that distinction. Essentially a physiographer who contributed to this branch of both geology and geography with his theory of the cycles of erosion in mountains, nevertheless, he had enough vision to advocate a scientific geography which included in its description "an account of the organic inhabitants of the regions as well as of the regions themselves."[4] Ellen Churchill Semple stands out as the leading woman geographer of our century. Imbued with Ratzel's correlations between man and his environment as discussed in his lectures and in the first volume of Ratzel's "Anthropogeographie" she endeavored to bring to American geography the need for stressing the environmental influences on man. In her work "Influences of Geographic Environment," Semple stresses the theme that:

> Man has been so noisy about the way he has conquered Nature; and Nature has been so silent in her persistent influence over man, that the geographic factor in the equation of human development has been overlooked.[5]

She thus complemented Davis and the two were the exponents of the school of geographical thought that has been labelled as "environmentalistic." The importance that physiography and physical geography have had in geography as courses in the curriculum and in the philosophy of geographical interpretation is owed largely to Davis and Semple and, thru them, to the German school of geographical thought of the latter nineteenth century, as well as to the American scientists exploring the Far West.

EARLY COLLEGE GEOGRAPHY

In the United States, geography on higher educational levels is largely a development of the twentieth century. It is true that as early as 1784 John Daniel Gross was Professor of German and

Geography in Columbia College, and was succeeded by John Kemp who rendered services until 1812. However, geography taught during those early days could hardly be recognized as such today. Princeton secured from 1854 to 1880 the services of Arnold Guyot, one of Ritter's students and a former colleague of Louis Agassiz. Guyot contributed to teaching and research some of Ritter's methods but tainted much more by the teleological, non-scientific approach than was shown in the works of his old German teacher. Another example of pioneer work in geography of university level was given by Daniel C. Gilman, Professor of Political and Physical Geography at Yale from 1863 to 1872. However, as Dryer stated in his 1924 article, these cases "were not incidental to any general growth but local and personal sports."[6]

At the end of the nineteenth century, geography was established in some of our leading universities, largely as a physiographic subject and connected with the department of geology. Another branch of the science, commercial geography, was shortly to gain momentum with its introduction in the Wharton School of Finance and Commerce at the University of Pennsylvania. The evolution of modern economic and regional geography can also be traced to that commercial geography which in its early stages dealt only with a mass of uncorrelated statistics. The record shows that the following universities have included some form of geography in their curriculum since the year indicated[7]:

Princeton	1854	Pennsylvania	1892
Yale	1863	Washington (Seattle)	1895
Harvard	1890	Columbia	1896
Northwestern	1890	Montana	1896
Chicago	1892	California	1898
Cornell	1892	South Carolina	1898

In his article written at the turn of the century, Dryer states that at that time there were only three full professors of geography: the eminent physiographers, Davis (Harvard), Libbey (Princeton), and Tarr (Cornell).[8]

College Geography During the Twentieth Century

During the present century, colleges and normal schools have shown an increasing interest in geography. Some realized early that unless teachers are well trained in the subject matter, the best methods imbued in the pedagogical courses are a failure when practiced in the classroom. It was obvious that geography, altho

deficiently taught, was an important part of the curriculum of the elementary and successive levels. The growth of efficient geography instruction in teachers' colleges and normal schools was absolutely necessary to raise the level of geography in the public schools from courses dealing only with capitals, boundaries, rivers, mountains, or statistics to an inspiring, well interrelated subject surveying human activities thruout the earth. Liberal Arts colleges, more slowly perhaps, also added the science to enrich the curriculum in the geology, economics, or social science departments.

In 1906, Cook reported about geography teaching:

> If we except physical geography in which subject almost all of the institutions offer courses in connection with the study of geology, we find little work in this subject.[9]

However, already in 1903, the University of Chicago, one of our leading institutions, had started a separate geography department that was going to render valuable service to the teaching of undergraduate and graduate geography under such leaders as Salisbury, Barrows, and Semple.

By 1910, geography was taught in 24 out of the total 40 state universities; whereas only five offered geography instruction in 1901.[10] The number of separate departments had increased to six, and nineteen colleges had added the subject to their curricula. The World War was a stimulus for the development of interest in the science. At the beginning of the 1920-30 decade, further progress is reported in a series of papers by Dryer, Miller, and Whitbeck. Dryer informs that out of 120 states and private institutions, 73 offered one or more courses of geography, up to a maximum of 20 in Wisconsin, 23 in Clark, and 49 in the University of Chicago; all of them, it is true, were universities with strong graduate departments, but largely appealing to prospective teachers. Of the courses offered, physiography led in the total number of students taking it, but in the total number of courses offered it was surpassed by regional as well as by economic geography courses.

Miller in 1922 coroborates the progress achieved during this century by showing that whereas in 1895 it was possible for a student to secure thirty-one one-year courses of collegiate geography, twenty-five years later he could take 321, representing an increase of 961.5 per cent.[11] The growth of the number of students taking geography in one single university was demonstrated by Whitbeck in connection with the University of Chicago.[12] The figures were 100 for 1900, 607 for 1910-11, and 916 for 1916-17. In the six-year

period from 1910 to 1916-17, the number of geography students at the University of Pennsylvania increased from 260 to 2,319. Thus, both privately endowed and state universities showed notable development.

Surveys conducted at the end of 1920-30 decade, or at the beginning of the next, give the most complete picture that applies to the current situation. Of the teacher-training institutions surveyed by Cunningham practically all offered courses in geography and most had a separate department of this discipline. Courses on the fundamentals of the science, economic and regional geography and physiography appeared most often in the curriculum.

> In a few institutions, most frequently in the one-year or two-year normal schools, methods courses only are offered. In most schools, however, either one or two content courses are prerequisite to method courses.
>
> Ninety-two per cent of the institutions offer "Fundamentals in Geography." . . . Seventy-two per cent of the institutions offer "Economic Geography"; a few offer two courses in this subject.
>
> Sixty-one per cent of the teacher-training institutions maintain separate departments of geography.

In the conclusions, Cunningham classifies the teacher-training institutions into three groups dependent on their attitude towards geography:

> First, there are those institutions (only a few) that offer no courses in geography yet purport to train teachers to teach in the elementary schools. Second, there is a group of teacher-training institutions that offer a few courses in geography to train teachers who can teach geography along with other subjects. Third, there are those institutions that permit the students to pursue geography as a major or as a minor and offer many courses in the subject, so that they can train special geography teachers.[13]

In the Liberal Arts colleges, the status of geography in 1929 was not as prominent as in the strictly teacher-training institutions, but undoubtedly had shown a steady progress since the beginning of the century. The most complete picture of the situation is given in a study by Hutter, the result of a careful search in the catalogues of 517 institutions. Briefly summarized by the author:

> Geography (including elementary geology) is offered in 377, or 73% of the liberal arts colleges. Courses strictly in geography are offered in 268 institutions or 52%. No geography in any form is offered in 140 institutions or 27%.[14]

The leading geography courses, in their order of importance, were: Economic Geography, Continental Studies (regional courses), General Elementary Geography, and Physiography. As to the administrative arrangement, in only 11 per cent of the institutions offering geography were there separate departments, but this propor-

tion was increased to 28 per cent if all the departmental headings, including geography with geology and mineralogy, are counted with the strictly geographical departments.

GRADUATE GEOGRAPHY

Graduate work in geography is a twentieth-century development in our American universities and most of the growth has been recorded after 1914. With the establishment of a separate geography department in Chicago in 1903, the first significant step was taken towards graduate instruction. In 1914, Brigham reports the existence of seven universities where geography could be taken as a major subject for the Ph.D.: Chicago, Columbia, Cornell, Nebraska, Pennsylvania, Wisconsin, and Yale.[15] In Illinois, Indiana, and Missouri it was offered as a minor subject for the highest degree. Two years later, according to Whitbeck, only seven masters and one doctorate were granted from four of the universities listed above and also from Harvard, California, and North Dakota. Whitbeck, thus, summarizes the standing of the leading departments:

> In the development of graduate work in geography the University of Chicago stands first, followed by the University of Wisconsin. Down to and including 1917 Chicago has conferred six doctorates in geography and 16 Master's degrees, while the University of Wisconsin has conferred one Doctor's degree and 14 Master's degrees.[16]

Miller confirms the above statement writing in 1922:

> The leading institutions in geography instruction are the University of Chicago, Columbia University, and the University of Wisconsin. At least fifteen years of consecutive work (year courses) may be taken in one of these universities.[17]

The opening of a complete school of geography at Clark University in 1921 represents a significant landmark in the progress of graduate instruction. As expressed by the editor of the JOURNAL OF GEOGRAPHY:

> It is of significance to geographic education in America whenever a new department of geography is established whether that department be in normal school, college, or university. However, it is of more than ordinary significance when a university with the standing of Clark decides to make geography its special field and chooses an eminent geographer as President.[18]

Under the leadership of President Wallace W. Atwood, manned by a competent staff, and backed by ample funds and facilities, Clark's School of Geography has come to take its place among the leading schools of this country, and of the world, within the short span of twenty years.

During the last two decades there has been an ever-increasing

demand for well trained professional geographers. Educational institutions above elementary levels require of their faculty members post-graduate training to the master or doctoral levels. In the federal and even state government departments, geography graduates are also in demand to act as meteorologists, cartographers, map curators, and research workers. Consequently, the number of those holding advanced degrees in geography has increased so much that now it is not easy to record the total as when done by Whitbeck for 1916. Complete data are not available for the master degrees granted in recent years, but we have been able to obtain information about doctorates from two excellent sources.[19] A total of 165 Ph.D.'s specialized in geography were completed during the fourteen-year period from 1925-26 to 1938-39, as revealed in the following table:

TOTAL NUMBER OF PH.D.'S IN GEOGRAPHY

Years	*Number*
1925-26 to 1928-29 (4-year period)	44
1929-30 to 1932-33 (4-year period)	38
1933-34 to 1936-37 (4-year period)	53
1937-38	13
1938-39	17
Total	165

As to the institutions graduating these candidates, over 30 per cent of the graduates received degrees from Clark University, 38 per cent from these others: Chicago, Michigan, and Wisconsin. The following table includes the above mentioned and sixteen other institutions granting doctorates during the 1925-1939 period with the number of degrees in each case:

Universities	*Doctorates Granted*
Clark	51
Chicago	30
Wisconsin	18
Michigan	14
California	9
Nebraska	8
George Peabody	7
New York	4
Cornell	4
Washington (Seattle)	3
Columbia, Ohio State, Virginia, Oklahoma, Washington (St. Louis), Harvard, each	2
Louisiana, Missouri, North Dakota, Pennsylvania, Yale, each	1

As to the academic status of all these universities some interesting correlations may be established. Of the twenty-one institutions granting Ph.D.'s during the 1925-39 period, fifteen are members of the Association of American Universities, the highest accrediting agency in this country. In addition, six others belonging to this exclusive group (Northwestern, Minnesota, North Carolina, Indiana, Illinois, and Catholic) offer graduate work in geography.[20] Advanced studies in geography are thus offered in those institutions which for many years have set the academic standards in the United States.

In 1934 the report of the Committee on Graduate Instruction of the American Council on Education classified the eighteen institutions then offering work for the doctorate.[21] Only nine universities were judged as "adequately staffed and equipped for work to the doctorate in geography." Just four, Clark, California, Chicago, and Michigan were designated as distinguished in that field. Whether we accept the survey in full or not, in geography it certainly indicated the leading schools at the time it was conducted.

PROGRESS IN IDEAS AND TECHNIQUE

An account of the status of geography in our American universities would not be complete without a statement of the growth of the science in its philosophy and contributions to knowledge. The mathematical count for the number of schools, their rating, courses, instructors, students, provides a tangible record of the growing importance of geography, but more important is to determine the progress in ideas within the science itself and, the outstanding contributions to other sciences or to world knowledge.[22]

A science that was born, at least in this country, largely as an offshoot of geology and physiography, today partakes as much of the social sciences as of its paternal physical sciences. Not only is man and his activities the center of the study of geography with the environment held as the background, but also the correlations between man and his environment have largely ceased to be a fixed pre-determined relation, with man a pawn in the hands of nature. It is true, there are still some pure environmentalistic scholars who lean to the materialistic interpretation of all forms of life and human events, influenced perhaps by Darwin, but more so by the German school of the latter nineteenth century, at least as interpreted in this country by its introducers. Nevertheless, there is a

growing sentiment among geographers that we need to scrutinize more closely some of the accepted generalizations in the field of human geography before laying laws or principles. This time it is man and human choice which need to be revalued as factors in the geographic equation.

The above statements do not imply that the study of the physical side of geography has declined during this century. Physiography is still very strong in the curriculum, in the textbooks, and monographs. This branch of geography has made great strides in recent years thru the work of the United States Geological Survey and of university scientists. Climatology is another of the physical fields on high standing which has made great progress in weather forecasting thru air-mass analysis and the furthering of world climatic interpretation and classification. In Soil Geography, the greatest progress has been accomplished thru the work of the Bureau of Chemistry and Soils, United States Department of Agriculture. The adaptation of the Russian technique to American conditions was largely the work of Marbut and his co-workers and followers. Plant Geography has probably lagged behind the above mentioned fields but we should record the outstanding work of American scientists in providing a geographical classification of North American plant associations.

As to the works in non-systematic geography with the emphasis placed on man and his activities, greatest advancement has been achieved during this century and especially since 1920. The introduction of the field technique practiced in the physical sciences has been of utmost significance. The detailed mapping of landforms, population distribution, types of settlement and farms, land utilization, in the field, has ushered a new approach, micro-geography, with unlimited possibilities. Dissertations, monographs, and recently textbooks, have been enhanced by the cartographical representation of data secured thru surveys of small areas, even of small farms. The practical utilization of this technique has been recognized by governmental agencies such as the Tennessee Valley Authority and the Soil Conservation Service, which employ a number of geographers as the professionally best fitted for evaluating the resources of an area from multiple points of view. Economic geography as a systematic science and regional geography as its areal, chorographic expression, today constitute the highest form of modern geography. The works both on methodology and on specific re-

gional problems have been so numerous that a list of all the geographers contributing to this field would almost be a register of the profession.

Political geography is another branch of the science with a rapid development after the First World War, influenced by Bowman's pioneer volume "The New World," as well as by the German postwar school of "Geopolitik." With the conflict now raging in Europe, this field has acquired renewed importance. In 1939 two political geography textbooks were published in addition to numerous articles on this field of geographical interpretation bordering the historical and political sciences.

As a cultural subject with practical applications, geography has today earned a deserving place in American higher education. As a science stressing the areal expression and correlation of human, economic, and physical phenomena, it offers a distinct point of view and a special technique. Thru its research, geography has added a wealth of data and interpretation. However, perhaps its greatest contribution to an era of extreme specialization is its ability to provide a much needed link between the modern physical and social sciences.

BIBLIOGRAPHY

1. Richard Hartshorne: The Nature of Geography, *Annals of the Association of American Geographers*, Vol. XXIX (1939), p. 257. The present author is indebted to this excellent monograph for many ideas expressed in the first part of this paper.
2. Hartshorne: *op. cit.*, p. 260.
3. See John Leighly: Methodologic Controversy in Nineteenth Century German Geography, *Annals of the Association of American Geographers*, Vol. XXVIII (1938), pp. 238-258; and R. E. Dickinson and O. J. R. Howarth: The Making of Geography, Oxford (1933), pp. 150-161.
4. William M. Davis: The Progress of Geography in the United States, *Annals of the* Association of American Geographers, Vol. XIV (1924), p. 210.
5. Ellen C. Semple: Influences of Geographic Environment, H. Holt and Co. (1911), p. 2.
6. Charles R. Dryer: A Century of Geographic Education in United States, *Annals of the Association of American Geographers*, Vol. XIV (1924), p. 143.
7. Data obtained from Dryer, *op. cit.* (tables on pages 144-146) and from H. L. Winstead: Geography in American Universities, JOURNAL OF GEOGRAPHY, Vol. XI (1912), pp. 309-316.
8. Charles R. Dryer: Geography as a University Study, *The Inland Educator*, Vol. VI (February, 1898), p. 7.
9. J. P. Cook: Geography in American Universities, JOURNAL OF GEOGRAPHY, Vol. V. (1906), pp. 429-431.
10. Winstead, H. L.: *op. cit.*, p. 311.
11. George J. Miller: Twenty-five Years Growth in Collegiate Geography, JOURNAL OF GEOGRAPHY, Vol. XXI (1922), pp. 34-37.

12. R. H. Witbeck: Geography in European and American Universities, JOURNAL OF GEOGRAPHY, Vol. XVIII (1919), pp. 129-141.
13. Floyd F. Cunningham: The Present Status of Geography in Teacher Training Institutions, Published in *The Teaching of Geography,* 32nd Yearbook of the National Society for the Study of Education, Bloomington, Illinois, 1933, pp. 546-551.
14. Harry K. Hutter: The Status of Geography in the Liberal-Arts Colleges of the United States, Published in the *Teaching of Geography,* 32nd Yearbook of the National Society for the Study of Education, Bloomington, Illinois, 1933, pp. 556-559.
15. A. P. Brigham: Remarks on Geography in America, JOURNAL OF GEOGRAPHY, Vol. XII (1914), pp. 202-205.
16. Whitbeck, R. H.: *op. cit.,* p. 135.
17. Miller, G. J.: *op. cit.,* p. 36.
18. JOURNAL OF GEOGRAPHY, Vol. XX (April, 1921), p. 158.
19. *American Universities and Colleges,* A Handbook of Higher Education, Clarence S. Marsh, editor; American Council on Education, Washington, D.C.; 1936, was used for data prior to 1935. Source for 1935-36 to 1938-39 data: Donald B. Gilchrist: Doctoral Dissertations Accepted by American Universities, H. W. Wilson Co. (Annual).
20. All other members of the Association of American Universities, with the exception of one, include some geography in their undergraduate curriculum.
21. Report of the Committee on Graduate Instruction, American Council on Education, Washington, D.C., April, 1934, pp. 18-19.
22. Thruout this century a series of papers by Atwood, Barrows, Davis (W. M.), Dyrer, Fenneman, Finch, Leighly, Sauer, Whitbeck on the contents and philosophy of geography have appeared in the *Annals of the Association of American Geographers,* largely as presidential addresses of that society. Richard Hartshorne's The Nature of Geography (*Annals of the Association of American Geographers*), Vol. XXIX (1939), pp. 171-658, is the most recent and one of the best contributions. It also includes an excellent bibliography on the subject.

RAINFALL CONDITIONS AS A SOUTHERN HANDICAP

STEPHEN S. VISHER
Indiana University

The South has been called America's "problem region." Many southern people are financially poor and culturally below the American standard. Various influences have been blamed for their status. Among these are the Civil War, the Negro, the dominance of cotton, and the inadequacy of local capital. Geographic conditions have also occasionally been blamed, especially the long hot season and the comparative infrequency of stimulating changes of weather.

Rainfall conditions, however, seldom have been considered to be significant in understanding the South. The purpose of this article is to point out some rainfall conditions which clearly adversely affect the South.

UNDESIRABLE SEASONAL DISTRIBUTION OF RAINFALL

Altho the South (the South-Central and the South Atlantic States) usually receives more rainfaill per year than the North-Central and Northeastern States (here called the North), it receives a larger share during the cooler months. During the warmer months it receives little more, and often less rain than the North. Moreover, in the South the high average temperatures of the warmer half-year increase the water requirement of plants, with the result that dry periods cause more damage to identical plants in the South than in the North.

The chief reason why the seriousness of dry spells in the South is not more widely realized is that the chief cash crop of the South is remarkably well adapted to such drouths as occur. Cotton has a long growing and flowering period, and has no short critical period during which rainfall is required. If a dry spell comes in early or mid-summer the cotton plant usually recovers sufficiently after the drouth to yield a part of a crop; if the dry spell comes in the late summer, checking further flowering, the bolls of cotton formed before the drouth yield a part of a crop. Moreover, partly because of the great areal extent of the South, drouths do not affect more than a third or a half of it at a time. As a result, the total cotton crop seldom is less than two-thirds normal. Such a fluctuation is much less than occasionally occurs in the semi-arid and sub-humid winter wheat and spring wheat belts, or even in the corn belt. In Indiana, for example, the state average yields of wheat, oats, and

corn are twice as great in favorable as in unfavorable years, and in Nebraska the contrast between good and bad years is sometimes more than fourfold—indeed sometimes there is widespread crop failure.

Altho the South's total cotton crop is comparatively uniform, the yields of crops which have a short critical period fluctuate radically. For example, there often is a local crop failure of corn, the South's second crop, and the average yield of corn per acre is less than half that in the North. The average southern yields of wheat, oats, and rye are about two-thirds as great as Northern yields. The fluctuations from year to year east of the Great Plains is much greater in the South than in the North.

Parkins in his monumental book, *The South,* states "dry spells are the most widespread and destructive of all weather phenomena to agricultural operations in the South."

Heavy Cool Season Rainfall

The South receives, on the average, twice as much winter precipitation as the North. Moreover, in the North an important share of the winter precipitation is snow which protects the ground against the erosion which winter rains cause. Indeed, rainfall during the cooler months very seldom does much good and usually does harm because most cool season rainfall runs away, either on the surface, carrying with it soil, or else, in porous materials like sand, thru the porous soil, leaching it badly.

Thundershowers

Another unfavorable aspect of the rainfall of the South is the comparatively large share which falls as sharp showers in thunderstorms. "Cloudbursts" altho often welcome sources of needed water, are much less desirable in several ways than are gentle rains.

On the average the South has more than twice as many thunderstorms as the North; the Gulf Coast east of the Mississippi has more than three times as many as the Canadian border. Moreover, in the North, thunderstorms almost all occur in late spring and summer, while in the South they occur thruout the year.

The total amount of rain which a thunderstorm yields depends upon the intensity of the storm and the amount of moisture available; the amount of rain falling on any spot depends in part upon the rate of movement of the storm. Southern thunderstorms normally yield a larger total of rainfall than northern ones because

of their greater intensity and the greater availability of moisture from the Gulf of Mexico. They also yield greater local falls because many of them do not soon move to another locality. Most northern thunderstorms move ten to twenty miles an hour eastward, propelled by the westerly winds which prevail overhead. Many southern thunderstorms move very slowly and hence shower their rain upon a smaller area. Indeed, a single thunderstorm occasionally continues to yield rain for many hours, while very few northern thunderstorms yield rain for more than two or three hours at one place.

Even in the North, many downpours of rain characteristic of thunderstorms cause local damage from flooding and soil erosion. In the South, thunderstorms cause much more damage because of their greater rainfalls and the fact that they occur even in the cooler months when there is less evaporation and when less of the rain is taken up by the soil.

Records show that rainfalls of a half inch of rain within five minutes occur in each part of the South in half of the years, five times as often as such sharp showers occur in Indiana and Wisconsin. An inch of rain falls in ten minutes once in about seven years in the South, or about eight times as often as in the North. Two inches in a half hour falls once in about six years in the South, or ten times as frequently as in the North. Three inches falls in an hour once a decade in the South on the average, while the North does not get such a cloudburst more than once a century. Five or six inches of downpour occur in an eight hour period once a decade near the Gulf, but most of the northern border of the country never has had such a deluge.

"Excessive" rains are practically unknown in winter or in March and April in the North but occur at least once in each normal winter and three times each spring in all parts of the South. During the autumn months, sharp rains are more than twice as frequent in the South as in the North. In summer, the regional contrast in frequency is small, but the rainfall totals in the South are greater.

Other studies show that the frequency of days with rainfalls of more than two inches is more than four times as great in the South as in the North, and rains of over an inch an hour are more than five times as frequent.

Twenty-four Hour Rains in Excess of Ten Inches

A special study of exceptionally heavy rains reveals a sharp regional contrast in both size and frequency. Few northern Weather

Bureau Stations have ever received as much as eight inches of rainfall in a single day, very few scattered stations have received more than ten inches, and none have received 15 inches. In the South, however, most stations have received at some time or other more than eight inches of rain in 24 hours, 29 stations have received more than 15 inches, and seven have received more than 20 inches in 24 hours. The four highest records are 23.2 inches at New Smyrna, Florida (October 10, 1924), 23.1 inches at Taylor, Texas, 22.2 inches at Altapass, North Carolina, and 21.4 inches at Alexandria, Louisiana.

As the normal annual rainfall of most of the South is less than 50 inches, a fall of 15 inches in 24 hours means that more rain sometimes falls in 24 consecutive hours than usually falls in four months in the South, or in half a year in Iowa, or in the entire year in the Great Plains.

The South's exceptionally heavy rains occur in all months of the year; of 129 rains which yielded 10 inches or more in 24 hours, 5 occurred in winter, 18 in spring, 45 in summer, and 51 in the autumn. The 29 rains of more than 15 inches occurred in nine months, six in June, six in October, four in July, four in September, three in November and one each in February, April, May and August.

An analysis of the frequency of exceptionally heavy rains which occurred in a ten year period revealed that the five states bordering the Gulf of Mexico plus Georgia and South Carolina (the seven states of the "Deep South") had eight rains of 15 inches or more in 24 hours.

The eight states of the "Upper South" (Oklahoma to Maryland) had no such big rains in that decade, nor did the North. The Deep South had 58 rains of from 10 to 14.9 inches in 24 hours in the decade, or an average of nearly six per year; the Upper South had seven, and the North three. Of rains of over 10 inches in 24 hours the Deep South has about ten times as many as the Upper South and 23 times as many as the North, which is about six times as large an area. Thus, in proportion to area, the Deep South has about twelve times as many big rains as the Upper South and more than a hundred times as many as the North.

Many of the very big rains accompany tropical cyclones of which there are three chief sorts, hurricanes, strong windstorms, and disturbances which have relatively little wind but which cause heavy rainfall. Tropical cyclones are most numerous in summer and autumn, and usually lose much of their violence before they

have travelled far over the land.

The greater intensity of rainfall in the South than in the North sketched in the foregoing paragraphs adversely affects the Soutn in several ways. Altho great floods are usually caused by prolonged heavy rains, such brief rains as are here discussed produce local floods which do considerable damage to crops, drown livestock and sometimes people, injure roads, railways, bridges and buildings. For example, a deluge of 15 to 20 inches of rainfall in 24 hours near San Antonio, Texas on June 30, 1940 caused seven drowning deaths and an estimated property loss of $740,000, consisting of $200,000 loss to roads, buildings, etc., $455,000 loss to crops, and $85,000 loss of livestock.

The most serious damage caused by the South's intense rains is, however, the damage they do to the soil. Upon even slightly sloping land, such deluges of water run off in torrents carrying away much soil. Already a very large share of the sloping land once farmed has either been abandoned because of soil loss, or is relatively infertile because much of the top soil is gone. The soil on level land is also injured by such excessive rainfalls in two other ways. If the land is sandy, the water enters it and dissolves part of the mineral plant food, carrying it away underground until it escapes as seepage or springs. Much southern land is so badly leached that much fertilizer is required to obtain even a small crop. (The South uses much more fertilizer than the North, chiefly because fertilizer is more necessary there.) Various other level tracts, for example the floodplains of rivers, are damaged by heavy rains in an unexpected way. Such areas are flooded and covered with a layer of mud or other sediment brought by the flood. It has been generally assumed that the land is made more fertile by such a deposit. But in the South there has been so much soil erosion that the runoff now often carries not only fertile topsoil but also infertile subsoil and even sand and gravel. When such materials are laid down on fertile floodplains, the land becomes less fertile—indeed may cease to be useful for agriculture.

These facts as to some rainfall handicaps of the South indicate clearly that the people of the South are by no means entirely to blame for the widespread poverty and cultural backwardness or for the serious soil erosion. While erosion is much increased by the type of agriculture practiced, cotton culture is largely a logical response to the rainfall and temperature conditions. Indeed the solution of the South's problems is by no means simple, partly because of the rainfall conditions here discussed.

SOIL AND WATER CONSERVATION*

DAVID O. DAVIS
Soil Conservation Service, Fort Worth, Texas

The soil has always been taken more or less for granted and there may be nothing so very strange about the fact that most people have paid little or no attention to it. It does seem somewhat strange that people, knowing about the relationship of the soil with their own personal happiness and well-being, have not noticed or cared about the fact that, thru misuse, the soils of this Nation are being rapidly depleted because of soil erosion.

Individuals could not be expected to know that soil erosion costs the people of the United States nearly four billion dollars each year, that 282 million acres of crop and grazing land have been allowed to erode to a point where productive use of the land is no longer possible; and that erosion is already seriously injuring 775 million acres—in other words that half the land of the country has been damaged by soil erosion. People could not know this, not at first anyway. But they could *see,* and it is strange that, seeing, they have not been at least curious about what is taking place. People have driven along the highway and have seen so many evidences of land misuse and soil wastage. They have seen the wreck of what was once a good forest, and they may have even been caught in a forest fire or on a burning prairie. It is possible to pass miles of land on which bony animals are attempting to find a bare existence. Cultivated fields are seen in which gullies have cut great slashes, thus preventing efficient agricultural activity. People are heard to swear at sandstorms and are heard to swear again when they have to wait at one side of an overflowing stream until it goes down before they can cross in their car. Muddy water, gullies, buried fences, houses sitting high and dry upon land which has eroded away from underneath them, roadside ditches which have almost become ravines, dredges in operation removing the silt from streams formerly free of it, lakes which have lost their full capacity as a result of the mud piled high behind their dams; all these enter the picture. In addition there are still other scenes, scenes of poor people raising poor crops on poor land, abandoned farm homes, and even whole towns apparently on the way to oblivion. All these

* Résumé of talk on soil and water conservation at National Council of Geography Teachers meeting, Baton Rouge, Louisiana, December 27, 1940.

things affect the life of the observer, whether he be a farmer or not.

Persons who have been inquisitive have found the land a very interesting object for study. When the soil is cut thru as in a ditch bank, it is found not to be just a mass of material laid down in a haphazard fashion but a highly specialized creation in layers. It will be noticed that the plants growing from it seem to depend mostly upon what is in the top layer and that underneath this top layer there may be two more layers. These layers are the still unformed and only partially formed portions of the soil. The history of the soil is measured in countless ages during which rocks and rock material were worn and broken down and changed by the action of the natural forces of climate and the chemical, biological and physical reactions which affected these rocks. If the resulting soil has not been mistreated, nature distinctly marks the fact. Clear blue streams may be seen; smooth grassy prairieland; forests with deep litter of leaves on the unbroken surface of the land beneath the trees tell the story. The natural spread of grass, vines, shrubs and trees into old fields makes a scene to show nature's plan of soil husbandry.

A person who has learned to observe the misuse of land and the resulting damage will also appreciate the sight of land which men are using wisely by following nature's plan.

Grass land will be noticed and people will comment on its beauty. Grass plays an important part in its relationship to the soil. The well managed pasture upon which sleek fat animals feed, and the beautiful meadow with sweet smelling new-mown hay, are not only the sources of our present milk and meat, leather, and wool, but are pieces of land which are being kept so that they will continue to produce equally as well, or better, for generations to come. When a person sees a field that has been handled with care, he sees cultivation following beautiful curves around the hill to form barriers against the forces of running water or he sees other fields covered with a dense mass of useful vegetation, vegetation useful not only to man but also useful to the soil as protective cover during periods of rough weather. There is a "healthy" appearance about the woods where care has been exercised that wood products may not only be improved in amount and quality, but that production may be sustained indefinitely. Farm ponds are seen and vegetation planted along the highways. Such measures are indications of wise land use. Even the quail that rise suddenly as one walks thru the fields would not be there if the land were bare and wasted. The

fisherman at the side of the creek bank is able to catch fish only because the land around that stream has not been totally misused.

Whether it be the scenes of waste or the scenes of good stewardship of the land, everyone who looks has a "stake" in the result. For it is true that the lives of people are affected by the land on which they live and by the way in which they use that land. Altho only one group of people is commonly associated with the soil, namely the farmers, there is no walk of life which is not directly affected by the soil and its productivity. A person may not think about it but nevertheless there are many sheep, many cattle, many hogs and many goats, and many acres of cotton, corn, flax, sugar cane, and timber that enter into the manufacture, for example, of an automobile. This is just one of hundreds of industries which depend upon one or more products directly produced in the soil.

The tall skyscrapers in the large city were built primarily as a result of the productivity of the land either surrounding the city or in areas remote from it but upon which it is dependent. And the great city with its towering buildings and busy offices and factories or the small quiet hamlet are in no wise different. In both places are people who first of all must *eat* if they are to go on living. People cannot digest the soil itself but must depend upon the plants to do it for them. People must also have clothing and shelter, most of which comes from the soil. And inasmuch as the lives of all are so interrelated, then whatever befalls some must inevitably affect others. Where there are great areas of poor land upon which people live in want, and toil with very little return, the commonwealth is inevitably affected for the worst. And where there is a minimum of poverty in any group, all will benefit.

Thus while it is not so strange that the soil is unnoticed for itself alone, it is extremely strange that all people have failed to see that the soil of their nation is being rapidly wasted. It is their soil. Lately, however, society is becoming more aware of this fact. The most outstanding example of this awareness has been the organization within the last few years of so called soil conservation districts. These are organized by the landowners in specific areas and are a democratic institution by means of which farmers, and all others who are interested, may work together in cooperation with each other to bring about a solution and correction of their major problem of soil loss. They may ask the assistance of any and all federal, state and local agencies. The farmers in their soil

conservation districts are thus creating a firm basis for a permanent and stable agriculture. By the end of the year 1940, thirty-eight states had passed soil conservation districts laws and 429 districts, embracing over 267 million acres, had been established.

Another outstanding example of awakening public interest is the spread of the study in the schools of the conservation of natural resources. The oncoming generation also must depend upon this land, and those adults who have put forward an effort to save the land now cannot carry the job on forever. There must be a conservation consciousness on the part of the youth of the land. They have one advantage over their adults for, in this country at least, they are growing up during the transition period between an era of exploitation and an era of conservation. Their elders before them knew only exploitation which generally means, in the long run, waste. The elders are learning conservation the hard way, by lack and want, as a result of waste. The youngsters can learn it now as an ideal—a national ideal—to defend the soil against erosion, to make the wisest use of the land, to receive the best for the longest period of time—for the greatest benefit of all.

ANNUAL MEETING NATIONAL COUNCIL OF GEOGRAPHY TEACHERS

The 28th annual meeting of the National Council of Geography Teachers will be held at the Barbizon-Plaza Hotel in New York City December 31 to January 2. Doubtless many of our members and friends will be interested in attending program sessions of the Association of American Geographers, which will be held at the same hotel December 29-31, particularly the joint session with the American Political Science Association on the morning of the 31st.

PRELIMINARY PROGRAM

Wednesday, Dec. 31, 10:30 A.M. *Meeting of Executive Committee*

Wednesday, 1:30 P.M., Intimate Theatre of Barbizon-Plaza

Greetings from the Geographers of New York. John K. Wright, Director American Geographical Society of New York.

Response. Esther S. Anderson, Second Vice-President of National Council.

Geography in the Illinois Five-Area Plan for Rural Schools. (20 min.) H. O. Lathrop, Illinois State Normal University, Normal, Illinois.

Geography in the New York State Social Studies Program. (20 min.) Mrs. Katheryne Thomas Whittemore, State Teachers College, Buffalo, New York.

Geography in a Core Curriculum. (20 min.) Adelaide Blouch, Public Schools, Lakewood, Ohio.

Discussion. (15 min.)

Effect of Comic Strips on Children's Geographic Concepts. (20 min.) Mary J. Read, State Teachers College, Milwaukee, Wisconsin.

Opportunity for Service in Latin America: A Challenge to the National Council. (20 min.) Harriet Shanks Platt, Co-ordinating Director Pan American Council, Chicago.

Following the program, National Council members and their families are invited to be guests of the American Geographical Society at a tea held at the Society's house, Broadway at 156th Street.

Wednesday, 7:30 P.M., Salon de Musique

OUT OF THE OLD YEAR AND INTO THE NEW (*Session open to all members of the National Council, and to members only*)

Work of the National Council as Seen by a New Secretary. Thomas F. Barton, Southern Illinois Normal University, Carbondale, Illinois.

Financial Status of the National Council. George H. Primmer, State Teachers College, Duluth, Minnesota.

Collaboration with Other Organizations.

In Boston with the NEA. Robert M. Brown, Professor Emeritus College of Education, Providence, Rhode Island.

In Lima with the Pan American Institute of Geography and History. Zoe A. Thralls, University of Pittsburgh.

At Indianapolis with the National Council for the Social Studies. Edwin H. Reeder, College of Education, University of Illinois.

Aids to Research in 1941. W. W. Atwood, President Clark University.

A Campaign for Better Teaching of Geography in the High School. A. H. Meyer, Valparaiso University, Valparaiso, Indiana.

Progress in Classifying Climates. E. E. Lackey, University of Nebraska, Lincoln, Nebraska.

Recent Research in Geographic Education. Norah E. Zink, State Teachers College, Indiana, Pennsylvania.

Plans to Stimulate Local Surveys by Schools. L. C. Davis, State Teachers College, Indiana, Pennsylvania.

Shifting the Burden of Responsibility. J. R. Whitaker, George Peabody College for Teachers, Nashville, Tennessee.

1942 in Prospect. Floyd F. Cunningham, State Teachers College, Florence, Alabama.

Thursday, 9:00 A.M., Intimate Theatre of Barbizon-Plaza

CONTINUED EDUCATION FOR TEACHERS IN SERVICE

A Program of Geography for Evening and Saturday Classes. (20 min.) John H. Garland, Western Reserve University, Cleveland, Ohio.

Problems of Teaching Geography by Correspondence. (20 min.) Wilbur M. Hanley, University of Wisconsin, Madison, Wisconsin.

A Geography Department Keeps in Touch with Its Graduates. (20 min.) L. C. Davis, State Teachers College, Indiana, Pennsylvania.

Discussion. (15 min.)

DIRECTING STUDENTS' OUT-OF-CLASS WORK

Practical Geography in the High School. (20 min.) Trevor Lloyd, St. John's High School, Winnipeg, Manitoba.

Assignments in Geography at the College Level. (20 min.) L. F. Thomas, Washington University, St. Louis, Missouri.

Laboratory Work for an Introductory College Course. (20 min.) Edith P. Parker, University of Chicago.

Questions. (20 min.)

Thursday, 2:00 P.M., Intimate Theatre of Barbizon-Plaza

PLACE OF GEOGRAPHY IN THE SOCIAL STUDIES

From the Viewpoint of the Whole Field of Social Education. (20 min.) Howard E. Wilson, Graduate School of Education, Harvard University.

From the Viewpoint of Conservation Education. (20 min.) J. R. Whitaker, George Peabody College for Teachers, Nashville, Tennessee.

From the Viewpoint of Orientation in the History and Culture of the Ancient World. (20 min.) Mima Maxey, The Four-Year College, University of Chicago.

As Evidenced by Significant Interrelations of Geography and American History. (20 min.) Erling M. Hunt, Teachers College, Columbia University.

As Contributing to Orientation in the Modern World of Business. (20 min.) Mattie Sue Walker, Commercial High School, Atlanta, Georgia.

From the Viewpoint of Orientation in a World of Changing National Boundaries. (20 min.) D. S. Whittlesey, Department of Geology and Geography, Harvard University.

Questions. (20 min.)

Thursday, 7:00 P.M., Les Charmettes Dining Room

Annual Dinner

The Changing Scene in the Amazon Basin. Earl P. Hanson, Editor of The Travelers Guide to the Latin American Republics.

Friday, 9:00 A.M., Intimate Theatre of Barbizon-Plaza

Fall River, a Study of Industrial Adjustment. (20 min.) Thomas R. Smith, School of Business, Columbia University.

The Amish and Their Garden Spot Agriculture in Lancaster County, Pennsylvania. (20 min.) Walter M. Kollmorgen, Associate Geographer, Bureau of Agricultural Economics, Washington, D.C.

Small-Scale Co-operative Industries in China. (20 min.) Ida Pruitt, formerly Head of the Social Service of the Peking Medical College, China.

Enriching the United States by Introducing Foreign Plants. (20 min.) B. Y. Morrison, Principal Horticulturist in Charge, Bureau of Plant Industry, Washington, D.C.

The Muskingum Basin as a Conservation Laboratory. (20 min.) C. F. Moses, Muskingum College, New Concord, Ohio.

Questions. (15 min.)

Friday Noon. *Board of Directors Luncheon and Business Meeting*

ALICE FOSTER
President

Plan to meet your friends and to make new friends at the National Council meeting.

A LETTER TO STATE COUNCILS OF GEOGRAPHY TEACHERS

TO CHAIRMEN OF STATE COUNCILS:

The National Council requests your participation in an experimental project aiming to bring about closer co-operation between state and national groups of geography teachers. One session of the 1942-43 meeting of the National Council of Geography Teachers will be opened to papers submitted by state councils. Since the National Council hopes by this means to become acquainted with talented younger members of the state and local groups, the contest is open only to people who have not presented papers at National Council meetings previously.

Following is a statement of what we ask you to do if you approve the idea presented above.

1. Arrange for scouts to represent your council in ferreting out exceptionally good papers presented between July 1, 1941 and June 30, 1942 (a) at your annual meeting, (b) at academy of science meetings in your state, (c) at local teachers' meetings, (d) at your state teachers' meeting, or (e) on chapter programs of Gamma Theta Upsilon.
2. Let a committee of your state council select the best three of these papers.
3. Submit this group of *best papers* to a committee of the National Council before August 15, 1942, in order that the best four or five papers may be invited for presentation at the 1942-43 meeting of the National Council. Early in 1942 the President of the National Council will announce thru the JOURNAL OF GEOGRAPHY specific directions for submitting the winning papers from each state.

With this request go the best wishes of the National Council of Geography Teachers for a large measure of success in the work of your state groups.

Cordially yours,

ALICE FOSTER, *President*
FLOYD F. CUNNINGHAM, *First Vice-President*
THOMAS F. BARTON, *Secretary*

EDITORIAL NOTES AND NEWS

A new oil tanker has appeared on the Danube, a foregear vessel, which has the propulsion unit encased in a "hollow bulbous nose." This is designed to check erosion on the banks of a narrow river or canal. Recent observations of its operation reveal that a velocity of nine knots an hour produces practically no wave action on the surface; hence, no bank erosion results from the passing of the vessel. Rumanian oil fields are the chief sources of the oil carried to Germany in power tankers for shallow waters. The Rumanian oil wells probably total about 2,000, in thirty odd fields. Two-thirds of the refining is done at Ploesti where the refineries have a daily capacity of 150,000 barrels. The major pipe lines from the Ploesti refineries and from the other nearby refineries take the oil to Constanta, the Black Sea port, or to Giurgiu, the Danubian port south of Ploesti. Rumors indicate that Germany has plans for another pipe line to Giurgiu now that the Black Sea route is blocked, and also for a pipe line directly west from Ploesti to the Danube, probably at or near Moldova which would materially shorten the river haul. Ploesti refineries are peculiarly vulnerable to air attack and so is the Danube route especially at the Iron Gate where the gorge is narrow enough to make the current so rapid as to necessitate a lateral canal. Some of the tankers navigate the Danube as far as Regensburg, then use the canal north to the Main River and thus enter the Rhine.

In the past, most people have seen the aurora borealis because they happened to be outside and looked skyward at the right time, or their friends were kind enough to tell them of the northern lights' appearance in the sky. On September 18, however, the radio, wherever it was able to function, carried notice of their unusual performance. In many parts of the United States the display was the most spectacular ever witnessed in these latitudes. Great streamers of faintly colored, blue-green light, sometimes rosy, played in ever-changing intensity across the sky as it hung like a flimsy curtain from overhead. Short wave radio operators tried vainly to get overseas stations, and wire communication in most parts of the United States was a jumble of noises and disconnected phrases. People sought vantage points outside the glare of city lights to observe the weird phenomenon. Information as to cause or meaning was eagerly sought from the newspapers and telephone offices. A few persons were actually on the lookout for them. They had been informed that a photograph of the sun taken on September 16 at the naval observatory, Washington, D.C., revealed a large cluster of sun spots. This unusual group of sunspots led a member of the Department of Terrestrial Magnetism of the Carnegie Institute of Washington to predict the aurora and the magnetic storm that it produces and its consequent disruptions to radio reception and wire communication. Is it probable that in the future general announcements of sunspot activity will be made, together with forecasts of special aid to communication agencies?

One of the most outstanding increases in oil production in 1940 was made by Egypt. Production is reported to have been about six and a half million barrels, nearly fifty per cent greater than the 1939 production. The production is in the vicinity of the Gulf of Suez. An increase was also noted in the Persian Gulf producing areas of Saudi Arabia which, together with the nearby Bahrein Island fields, produced nearly twelve million barrels.

The Southwest Social Science Association held its annual meeting at Dallas, Texas, April 11-12. Harriet Smith was chairman of the geography section. The program dealt

with various phases of conservation, land use, world problems and a changing world. Out-of-the-state speakers included C. J. Bollinger, University of Oklahoma; J. R. Whitaker, George Peabody College for Teachers; and H. J. Chatterton, Southwestern Louisiana Institute.

Forty-one states have enacted laws permitting farmers to establish conservation districts. Alabama is the first state having every acre of farm land in soil conservation districts.

The French State appears to be the title that the Vichy Government adopted last January when it dropped the word, Republic, from the name of France. Thus ended the Third Republic which had governed France since 1875 and which headed France's great colonial empire.

The Portuguese Government has opened an educational and cultural center in Rockefeller Center in New York City, called Casa de Portugal—House of Portugal. This is of special interest to Americans now that Portugal plays such an important role in establishing lines of transportation and communication between the Western Hemisphere and belligerent Europe. Significant will be the opportunity to learn directly of the contributions to the scientific knowledge of navigation which resulted from Portugal's school of navigation set up by Prince Henry. The achievements of this school opened navigation to wide ocean spaces in contrast with its former restriction to coastal waters. Added interest in Portugal lies in the fact that our trans-atlantic Clippers return from Lisbon by way of Bolama, on the coast of Portuguese Guinea, then fly across the Atlantic by way of Trinidad and Puerto Rico.

The Geography Club of Western Pennsylvania held its spring meeting in Pittsburgh. Mr. and Mrs. Davis, Indiana, Pennsylvania, gave illustrated talks on the South American Field Trip which they directed. The discussions centered around ways and means of enriching geographic instruction.

The National Park Service of the United States Department of the Interior has recently issued a beautifully illustrated set of booklets on our national parks in western United States, Hawaii, and Alaska. One of the latest additions to our parks is Kings Canyon National Park, California, created by act of Congress, May 4, 1940. It comprises superlative mountain scenery and three groves of sequoias.

Some tobacco growers are devoting part of their acreage to growing Nicotiana rustica, a species high in nicotine and nicotinic acid, reported to thrive on soils where other tobacco species may fail. Their experimentation is in line with the attempts of chemists to perfect the use of nicotine for making the nicotinic acid component of the vitamin B complex at a cost competitive with the less expensive coal tar source. The demand for nicotinic acid has been greatly increased since the Committee on Food and Nutrition of the National Research Council last January recommended it for enriching white flour.

The National Resources Planning Board recommends that municipalities of more than 10,000 population provide a minimum of one acre of park space for each 100 inhabitants.

According to Mineral Trade Notes, diamonds have been added to the list of strategic materials, and as such an agreement between the United States and Brazil provides that the United States purchase all of Brazil's diamond output for the next two years. Any surplus after the regular American buyers have made their purchases is to be bought by the United States Government.

A survey by the United States Department of Commerce of the six states in which tung trees are now growing—Florida, Georgia, Alabama, Mississippi, Louisiana, and Texas—reveals that the 1940 Tung nuts will yield 5,000,000 pounds of oil. Imports to the United States from China in 1939 totaled 79,000,000 pounds of oil, normally about 75 per cent of our needs. So far, the yield of our trees is about a ton or better of dried tung fruit to an acre. When milled this ton will probably yield more than a half ton of hulls of little value, about 320 pounds of meal, which is valued as a fertilizer, and 320 pounds or more of tung oil. Now that Chinese tung oil and other foreign supplies of substitute oils are curtailed and our own supply of tung oil is inadequate, the paint and varnish laboratories have to change their formulas and substitute other drying oils. The most outstanding recently developed substitute perhaps is dehydrated castor oil, which is dependent upon castor beans from Brazil and India. In the first quarter of 1941, about 33,000,000 pounds of castor oil were used by the paint industry. Other substitutes are obtained from fish oils, blended with linseed and soybean oils. The supply of gums and resins from the Far East being also cut off, substitutes have had to be developed from synthetic resins derived from domestic raw materials. One of these important supplies comes from pine rosin. The chemists exploring for new sources of pigments, oils and solvents and new processes are doing their best to solve the raw material problem and at the same time release those needed in defense industries.

The amount of magnesium extracted from sea water is greater than that obtained from all other sources in the United States. New methods of extraction have stepped up production to about 30,000,000 pounds in 1941. The principal use of the metal is that of a component part of aluminum alloys. Its weight being less than that of aluminum, it is superior for rapidly moving parts, especially those free from severely heavy strains.

Reports from the United States Bureau of Mines indicate that normally half of the world's tin is smelted in British Malaya, a quarter in the British Isles, and the remainder in the Netherlands, the Netherlands Indies, and China. As a war emergency, a government-owned smelter is being built at Texas City, near Galveston.

Our system of National Forests includes 175 million acres, or nearly one and a third acre for every citizen of the United States.

Approximately 75,000,000 trees were planted thruout the country this spring as a part of the program of the Soil Conservation Service. Two-thirds of the trees were planted by CCC workers, while farmers living in soil conservation districts planted most of the remainder. Most of the planting was done on badly eroded fields, in gullies, on hilltops, along stream banks, ponds, highways, and areas subject to wind erosion. Incidentally, they will provide shelter for game, supply wood for a variety of products, and add to the aesthetic value of the area.

GEOGRAPHICAL PUBLICATIONS

Vernor C. Finch, Glenn T. Trewartha and M. H. Shearer. **The Earth and Its Resources.** 634 pp., 418 photographs, maps and other illustrations. McGraw-Hill Book Company, New York, 1941. $2.40

The material of this book has been drawn from a college text (Finch & Trewartha: *Elements of Geography*) and has been given a happy secondary school application by M. H. Shearer. Tho this book is not formally compartmented, the contents nevertheless include three distinct disciplines, with all their ramifications: meteorology, geology, and economic geography proper. Yet it must be remarked that the text does not suffer in clarity and cohesion on this account.

The authors begin with a brief consideration of the earth as a celestial entity, proceed thru a study of the elements of weather and climate, and then advert lucidly to the great latitudinal areas of the earth's climate. Following this, they introduce the student to the "lithosphere" and the rubrics of geology and physiography. Especial pains are taken to fix the types, climatic as well as physiographical, on an international scale, tho emphasis is consistently on American areas.

One chapter is devoted to oceanography, and the remainder of the book—five chapters—to resources. The concluding chapter is a study of the resources of the United States and its physical regions. There are eight appendixes, all useful, seven black-and-white maps, and a good index. Each of the nineteen chapters has, besides numerous questions, appended lists of further reading material and suggested student activities. There is a laboratory manual to accompany the study of the text.

WALTER S. CREWSON

Washington High School,
Massillon, Ohio

Roderick Peattie. **The Incurable Romantic.** 270 pp., several pages of photographs. The Macmillan Company, New York, 1941.

This isn't a geography book and it isn't a book of high romance. It is Peattie's story of Peattie, a subject in which the author is deeply interested, in which the reader becomes pleasantly interested.

It is written exuberantly. The style varies. Dogmatic statements like ". . . Schools were the worst in the world," and ". . . is the most exact science in the world," are relieved by neatly turned phrases and much humerous humor.

Professional geographers will find Peattie's evaluations of Salisbury, Chamberlin, Atwood and other geographers spicy, his discussions of research in mountain geography provocative, and his philosophy of teaching challenging.

This reviewer recommends the book enthusiastically to undergraduate students of geography because it suggests that "it's fun to be a geographer."

L. C. DAVIS

State Teachers College,
Indiana, Pennsylvania

R. H. Whitbeck, Frank E. Williams, and William F. Christians. **Economic Geography of South America.** 469 pp. Illustrated. McGraw-Hill Book Co., N.Y., 1939. $3.50

Many sections of the former editions have been rewritten and reorganized. At the same time, the authors have not sacrificed the style which was so characteristic of the late Professor Whitbeck. Similarly, the contributions from his research and field studies

in South America have been incorporated with those made by Professor Williams. Greater emphasis is given to a more extensive regional treatment within each country. Many new illustrations have been added and new political and economic changes noted.

Index of Research Projects. Vol. 1. 291 pp. Works Progress Administration, Washington, D.C. 1938

Some 2,000 research projects have been carried on under the Civil Works Administration, the State Emergency Relief Administrations, and the Works Progress Administration. This volume contains a concise statement of the principal conclusions of each study and an alphabetical subject index of the contents. Nearly every field of the natural and social sciences has been touched upon in these research projects. Many of the reports have been published. Several hundred of the reports are in manuscript form, a microfilm copy of which may be had at nominal cost from the American Documentation Institute.

T. J. Eskridge, Jr. **Growth in Understanding of Geographic Terms in Grades IV to VII.** Duke University Research Studies in Education. No. 4. 68 pp. Duke University Press, Durham, N.C. 1939. $1.00

In view of the fact that children often use words that are almost devoid of meaning and significance to them, the author undertook this piece of research to learn the nature and extent of this lack of meaning of words used in the social studies, and to determine why this meaningless vocabulary develops. In the procedure, 135 geographic terms for testing were taken from texts used in the public schools of Greenwood, South Carolina. Then the factors which condition growth in understanding geographic terms were analyzed, and finally principles were derived by which growth in meanings is enhanced.

C. C. Carter and H. C. Brentnall. **Man the World Over.** 508 pp. Illustrated. D. Appleton-Century Co., Inc. N.Y. 1939. $3.00

This book is offered in order to afford a geographic background that the average person, with little or no geographic study beyond the grades, may have a better understanding of the world wide news reaching the public thru the increased facilities offered by modern communication and transportation. The maps are especially commendable in that each one effectively shows but a few facts of production and distribution. A similar clarity is characteristic of the diagrams and drawings. The photographs tho somewhat hazy are easily interpreted.

Proceedings of the American Philosophical Society. Vol. 82. No. 5, June, 1940. 430 pp. Illustrated. American Philosophical Society, Philadelphia, 1940. $2.50

This volume contains the papers read at the American Philosophical Society's meeting at Philadelphia, February 23-24, 1940. Nine of the papers deal with the Wilkes Exploring Expedition of the United States Navy, 1838-42. That the hundredth anniversary of this Expedition should be celebrated by the Society is most fitting, since the Society was called upon to help the Expedition draw up its scientific program and select its staff. The other nine papers deal with American Polar Exploration and are contributed by people outstanding in polar research and exploration.

E. C. Case and D. R. Bergsmark. **College Geography.** Second Edition. 767 pp. Illustrated. John Wiley and Sons, Inc., N.Y. 1940. $4.00

A text adapted for college courses dealing with the principles or elements of an introductory course as well as the fundamentals of economic geography. In the revision

the authors have rearranged the subject matter so as to secure a better understanding of the topics discussed, and of their relative economic significance. The text has been enriched and brought up to date. Spacial relationships and quantitative production are more readily gained by the new maps and grafs. Just as past changes have occurred, the reader is made aware of new trends and the expectations of inevitable changes and unsolved problems.

Chauncy Dennison Harris. **Salt Lake City, a Regional Capital.** 206 pp. + 15 maps. Private edition. Distributed by the University of Chicago Libraries, Chicago, Ill. 1940

The area covered includes Utah, southern Idaho, eastern Nevada, and southwestern Wyoming, with Salt Lake City as the functional center. The city is thus analyzed in terms of its functionings as a regional capital. This functioning is divided into these parts: the city in relation to the region, the interrelation of the city and the Wasatch Oasis, the trade flows of city and region, the planning factors, and the localization of regional functioning within the area. Excellent maps are included in a cover pocket. This geographic interpretation of the Salt Lake area represents a year of field and library studies within the area. It was presented in fulfillment of the doctorate at the University of Chicago. The techniques of this painstaking research reflect the training the author received there as well as in Oxford and the London School of Economics.

Charles Schuchert and Carl O. Dunbar. **A Textbook of Geology.** Part II. Historical Geology. 544 pp. Illustrated. John Wiley and Sons, Inc. N.Y. 1941. $4.00

The fourth edition of this college text is largely rewritten. The actual earth history is preceded by six chapters—the Prologue. Therein is presented the basic conceptions needed in the interpretation of the history. Students are introduced to the many evidences of former plant and animal life, as recorded by the bones, shells, or imprints preserved in rocks, and the subsequent changes that have followed as seen in the record in the rocks are placed against the scale of time. The facts of historical geology that follow reflect the continued changes and advances in the subject matter since its presentation in the earlier editions, the last of which appeared eight years ago. The appendix features a chapter orienting the students to animal and plant groupings.

Reginald Aldworth Daly. **Architecture of the Earth.** 211 pp. Illustrated. D. Appleton-Century Company, N.Y. 1938. $3.00

The substance of this volume was presented in a series of lectures given in 1937 under the auspices of the Norman Wait Harris Foundation of Northwestern University. The author interprets what he sees outdoors in the light of discoveries and clarifications made possible in geophysics since the opening of this century. The first part of the text deals with the surface of the crust of the postulated model the author uses to represent the earth. This is succeeded by a section dealing with the inaccessible part of the crust, followed by a discussion of the invasions of this crust by lava, and the consideration of the support on which the surface features of the earth rests. This volume is one of the Century Earth Science Series, of which Kirtley F. Mather is editor.